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FILE COVERS 1907 - 25 Nov 2003 VOL 139 ISS 22
FILE LAST UPDATED: 24 Nov 2003 (20031124/ED)

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    2050 OLIVES
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    55027 FLAVOR
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L2      9 OLIVES AND MALAXATION AND OLIVE(W)OIL

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L2      ANSWER 1 OF 9 CAPLUS COPYRIGHT 2003 ACS on STN
2003:651934 Document No. 139:322596 Air exposure time of olive pastes during
the extraction process and phenolic and volatile composition of virgin
olive oil. Servili, Maurizio; Selvaggini, Roberto;
Taticchi, Agnese; Esposto, Sonia; Montedoro, Gianfrancesco (Dipartimento
di Scienze degli Alimenti, Sezione di Tecnologie e Biotecnologie degli
Alimenti, University of Perugia, Perugia, 06126, Italy). Journal of the
American Oil Chemists' Society, 80(7), 685-695 (English) 2003. CODEN:
JAOCA7. ISSN: 0003-021X. Publisher: AOCS Press.
AB      The time of exposure of olive pastes to air contact (TEOPAC) during
malaxation was studied as a processing parameter that could be
used to control endogenous oxidoreductases, such as polyphenoloxidase,
peroxidase, and lipoxygenase, which affect virgin olive
oil quality. Phenolic and volatile compds. were analyzed in the
oils obtained using progressive TEOPAC at three ripening stages of
olives. Multivariate statistical anal. was applied to the raw
data. The phenolic concn. of virgin olive oil
progressively decreased with increasing TEOPAC. On the contrary, a pos.
relationship was found with the concn. of several volatile compds.
responsible for virgin olive oil aroma. The effect of
TEOPAC, however, was strictly related to fruit ripening.

L2      ANSWER 2 OF 9 CAPLUS COPYRIGHT 2003 ACS on STN
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- 2003:176501 Document No. 138:400568 **Olives** and their production waste products as sources of bioactive compounds. Vissioli, Francesco; Galli, Claudio (Department of Pharmacological Sciences, University of Milan, Milan, Italy). Current Topics in Nutraceutical Research, 1(1), 85-88 (English) 2003. CODEN: CTNRC3. ISSN: 1540-7535. Publisher: New Century Health Publishers, LLC.
- AB A review. **Olives** are rich in phenolic antioxidants that, during olive oil prodn., end up either in olive oil or, for their major part, in the waste water. In fact, during the malaxation process, i.e. the continuous washing of the olive paste with warm water prior to the procedure of sepn. of the oil from the paste, a considerable amt. of water is employed. This water, in addn. to that endogenously contained in the olives, make up to 50% of the total yield of the olive paste (olive oil amts. to .apprx.15%) and is named "waste water". In fact, due to the failure to develop a suitable end-of-pipe treatment technol., olive mill waste waters (OMWW) are currently discarded by olive oil manufacturers. In vitro, phenolic components of olive oil and its waste water have been shown to exert potent biol. activities including, but not limited to, antioxidant actions. Catechols from olive mill waste water can be isolated in rather pure form: 10-20 per cent of the total phenols is recovered and the only bioactive catechol is hydroxytyrosol. This ortho-diphenol has been shown by several authors to exert potent antioxidant and addnl. biol. activities, both in vitro and in vivo.
- L2 ANSWER 3 OF 9 CAPLUS COPYRIGHT 2003 ACS on STN
2002:848872 Method for flavoring an olive oil. Van Boom, Stella Sophia; Van Der Bruggen, Rob; Maitland, Reinout (Lipton, Division of Conoco, Inc., Neth.). U.S. Pat. Appl. Publ. US 20020164413 A1 20021107 (English). CODEN: USXXCO. APPLICATION: US 2001-25295 20011219. PRIORITY: EP 2000-204713 20001222.
- AB A process for the manuf. of a flavoured olive oil, comprising the steps of: mixing olives with one or more flavoring agents; subjecting the mixt. to a crushing and malaxation treatment obtaining a malaxation mash; sepg. the flavored olive oil from the malaxation mash; collecting the flavored olive oil.
- L2 ANSWER 4 OF 9 CAPLUS COPYRIGHT 2003 ACS on STN
2002:846022 Document No. 138:3782 Influence of olive processing on virgin olive oil quality. Di Giovacchino, Luciano; Sestili, Simona; Di Vincenzo, Daria (Istituto Sperimentale per la Elaiotecnica, Citta S. Angelo, 65013, Italy). European Journal of Lipid Science and Technology, 104(9-10), 587-601 (English) 2002. CODEN: EJLTFM. ISSN: 1438-7697. Publisher: Wiley-VCH Verlag GmbH & Co. KGaA.
- AB A review. Virgin olive oil quality depends on different factors such as olive cultivar, olive tree cultivation and the operations of olive picking, storage and processing. Many investigations concerning these factors were carried out and, in particular, the influence of technol. operations of olive processing on oil yields and quality was examd. Leaf-removal and olive washing are important operations for the mech. safety of the olive extg. equipment which operates at high speed and for the organoleptic quality of olive oil. The leaves mixed with olives may increase, in fact, the organoleptic attributes of "fresh-cut" grass or "green", esp. if metallic crushers are used to prep. olive paste. Olive crushing has an important influence on organoleptic and nutritional qualities of virgin olive oil. When mill stones are used, the obtained oils have a lower intensity of bitterness and pungency because this crushing method helps to produce oil with a lower content of phenolic substances. When metallic crushers are used oils have, due to the violent action, a higher content of phenolic compds. and are more bitter and pungent. Olive paste malaxation influences the oil yields and also the

antioxidant content of oil. With prolonged **malaxation** oil yields, generally, increase while the phenol content of oils decreases. When "difficult" olive pastes are processed, it is possible to increase oil yields by using technol. co-adjuvants such as talc and enzymic products during the **malaxation**. The sepn. of oil from solid and liq. phases of olive paste is performed by using either pressure, percolation or centrifugation systems. All systems may provide good-quality oil if olive fruits are sound and at the correct ripeness, but the centrifugation system helps to avoid or reduce the risk of an organoleptic contamination. The new centrifugal decanters, operating without adding water (or only a minimal amt. of water) to olive paste, save heat energy and the oils obtained are more fruity and have a higher content of natural phenolic antioxidants.

L2 ANSWER 5 OF 9 CAPLUS COPYRIGHT 2003 ACS on STN
2001:912024 Document No. 136:339650 Headspace analysis of volatile flavor compounds of olive oils from Lianolia variety. Skizas, N. T.; Tasioula-Margari, M.; Komaitis, M. M. (Department of Chemistry, University of Ioannina, Ioannina, 45110, Greece). Special Publication - Royal Society of Chemistry, 274(Food Flavors and Chemistry), 248-252 (English) 2001. CODEN: SROCD0. ISSN: 0260-6291. Publisher: Royal Society of Chemistry.

AB An HSGC method that allows the detn. of volatile flavor compds. from virgin olive oils is reported. The method was employed for the qual. detn. of the volatile compds. in olive oils from Lianolia variety. The contribution of the quality characteristics of **olives** and processing techniques used to ext. oil from **olives**, in the formation of volatile flavor compds. were evaluated. Hexanal and 2-hexenal-Z are the predominant volatile compds. contributing to a pleasant sensory perception of green, apple, almond and fruity. Aldehydes such as 2-Hexenal-E, 2-heptenal-Z, 2-decenal-Z, octanal, nonanal and pentanal, responsible for undesirable flavor, were identified in samples with lower quality indexes (high acid and peroxide values). The absence of esters is probably due to the olive tree variety and to the fact that high temps. were used during **malaxation** process.

L2 ANSWER 6 OF 9 CAPLUS COPYRIGHT 2003 ACS on STN
2001:816827 Document No. 135:357095 Method for processing **olives**. Maitland, Reinout; Van Putte, Karel Petrus Agnes Maria; Stavridis, Vangelis; Tornaletti, Nicola (Unilever N.V., Neth.; Unilever PLC; Hindustan Lever Ltd.). PCT Int. Appl. WO 2001083654 A1 20011108, 18 pp. DESIGNATED STATES: W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG, TR. (English). CODEN: PIXXD2. APPLICATION: WO 2001-EP4711 20010425. PRIORITY: EP 2000-303746 20000504.

AB The level of polyphenols in an **olive oil** can be increased by adding water to the **olives** during the crushing of the **olives**. In particular the invention concerns a method for processing **olives** obtaining an **olive oil**, comprising the steps of (a) crushing the olive through a sieve in the presence of 1-40% water, based on the wt. of the **olives**; (b) **malaxation** of the **olives** obtained in step (a); (c) decanting the **olive oil**.

L2 ANSWER 7 OF 9 CAPLUS COPYRIGHT 2003 ACS on STN
2001:491188 Document No. 135:210057 High-performance liquid chromatography evaluation of phenols in virgin **olive oil** during extraction at laboratory and industrial scale. Garcia, Aranzazu; Brenes, Manuel; Martinez, Fernando; Alba, Jose; Garcia, Pedro; Garrido, Antonio

(Food Biotechnology Department, Instituto de la Grasa (CSIC), Seville, Spain). Journal of the American Oil Chemists' Society, 78(6), 625-629 (English) 2001. CODEN: JAOCA7. ISSN: 0003-021X. Publisher: AOCS Press.

AB Phenolic compds. are of fundamental importance to the quality and nutritional properties of virgin olive oils. The HPLC anal. of simple and complex **olive oil** phenols in the streams generated in the 2-phase extn. system was carried out using Arbequina and Picual olives. The **malaxation** stage reduced the concn. of o-diphenols in oil ca. 50-70%, while the concn. of the non-o-diphenols remained const., particularly the recently identified lignans 1-acetoxy pinoresinol and pinoresinol. Oxidn. of o-diphenols at lab. scale was avoided by malaxing the paste under a nitrogen atm. Phenolic compds. in the wash water used in the vertical centrifuge were also identified. Hydroxytyrosol, tyrosol, and the dialdehydic form of elenolic acid linked to hydroxytyrosol were the most representative phenols in these waters. Hence, phenolic compds. in the wash waters came from both the aq. and the lipid phases of the decanter oily must.

L2 ANSWER 8 OF 9 CAPLUS COPYRIGHT 2003 ACS on STN
1999:563327 Document No. 132:34978 Assessment of some enzymatic activities related to qualitative aspects of **olive oil**. Patumi, M.; Rocchi, P.; Vergari, G.; Fontanazza, G.; Nucci, R. (Ist. di Ricerche sulla Olivicoltura, Perugia, 06128, Italy). Acta Horticulturae, 474 (Vol. 2, Third International Symposium on Olive Growing, 1997), 635-638 (English) 1999. CODEN: AHORA2. ISSN: 0567-7572. Publisher: International Society for Horticultural Science.

AB PAL (L-phenylalanine ammonia lyase; E.C. 4.3.1.5), PPO (polyphenol oxidase; E.C. 1.14.18.1) and POD (peroxidase; E.C. 1.11.1.7) were examd. in freshly milled **olives** and(or) after thirty minutes of **malaxation**. PAL activity varied with the cultivar; it seemed to be correlated with the phenol content in the oil. PPO and POD had a lower level of activity in all the cultivars and they remained active throughout the entire kneading time. The anal. of some products that can be generated by the oxidn. of triglycerides revealed that they may also be present in freshly-obtained oil, although in very low quantities.

L2 ANSWER 9 OF 9 CAPLUS COPYRIGHT 2003 ACS on STN
1995:519455 Document No. 122:298024 Waste waters from **olive oil** production are rich in natural antioxidants. Visioli, F.; Vinceri, F. F.; Galli, C. (Inst. Pharmacological Sci., Univ. Milan, Milan, I-20133, Italy). Experientia, 51(1), 32-4 (English) 1995. CODEN: EXPEAM. ISSN: 0014-4754. Publisher: Birkhaeuser.

AB Milling of olive paste during **olive oil** prodn. is accompanied by continuous washing with water, i.e. **malaxation**. The resulting wastewater is currently discarded. Since **olives** and **olive oil** are rich in natural antioxidants, we hypothesized that some of these might be extd. from the olive paste during **malaxation**. Interest in natural antioxidants is increasing because of the growing body of evidence indicating the involvement of oxygen-derived free radicals in several pathol. processes, such as cancer and atherosclerosis. A wastewater ext. was characterized by HPLC and tested in a model of lipid peroxidn., copper sulfate-induced oxidn. of low d. lipoproteins. The results demonstrate that wastewater exts. have powerful antioxidant activity and might therefore represent a cheap, as yet unused, source of antioxidants.

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26745 OLIVE

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L4 25 OLIVE AND MALAXATION

=> d l4 cbib,ab 1-25

L4 ANSWER 1 OF 25 CAPLUS COPYRIGHT 2003 ACS on STN
2003:877574 Varietal and processing effects on the volatile profile of Australian olive oils. Tura, Debora; Prenzler, Paul D.; Bedgood, Danny R.; Antolovich, Michael; Robards, Kevin (School of Science and Technology and Farrer Centre, Charles Sturt University, Locked Bag 588, Wagga Wagga, 2678, Australia). Food Chemistry, 84(3), 341-349 (English) 2004. CODEN: FOCHDJ. ISSN: 0308-8146. Publisher: Elsevier Science.

AB The volatile profile of virgin olive oils was established using SPME and gas chromatog. (-mass spectrometry). The major volatile in approx. 50% of the oils was E-hex-2-enal in contrast with European oils. The minor contribution of C5 compds. to the volatile profiles also contrasted with data on European oils. Hierarchical Cluster Anal. (HCA) implicates variety as the single-most important factor in detg. volatile profile while malaxation time and temp. exerted a minor secondary effect on the volatile profile.

L4 ANSWER 2 OF 25 CAPLUS COPYRIGHT 2003 ACS on STN
2003:651934 Document No. 139:322596 Air exposure time of olive pastes during the extraction process and phenolic and volatile composition of virgin olive oil. Servili, Maurizio; Selvaggini, Roberto; Taticchi, Agnese; Esposto, Sonia; Montedoro, Gianfrancesco (Dipartimento di Scienze degli Alimenti, Sezione di Tecnologie e Biotecnologie degli Alimenti, University of Perugia, Perugia, 06126, Italy). Journal of the American Oil Chemists' Society, 80(7), 685-695 (English) 2003. CODEN: JAOCA7. ISSN: 0003-021X. Publisher: AOCS Press.

AB The time of exposure of olive pastes to air contact (TEOPAC) during malaxation was studied as a processing parameter that could be used to control endogenous oxidoreductases, such as polyphenoloxidase, peroxidase, and lipoxygenase, which affect virgin olive oil quality. Phenolic and volatile compds. were analyzed in the oils obtained using progressive TEOPAC at three ripening stages of olives. Multivariate statistical anal. was applied to the raw data. The phenolic concn. of virgin olive oil progressively decreased with increasing TEOPAC. On the contrary, a pos. relationship was found with the concn. of several volatile compds. responsible for virgin olive oil aroma. The effect of TEOPAC, however, was strictly related to fruit ripening.

L4 ANSWER 3 OF 25 CAPLUS COPYRIGHT 2003 ACS on STN
2003:195544 Document No. 138:353023 Effect of olive paste kneading process time on the overall quality of virgin olive oil. Ranalli, Alfonso; Pollastri, Luciano; Contento, Stefania; Iannucci, Emilia; Lucera, Lucia (Istituto Sperimentale per l'Elaiotecnica, Department of Olive Oil Technology and Quality, Pescara, 65013, Italy). European Journal of Lipid Science and Technology, 105(2), 57-67 (English) 2003. CODEN: EJLTFM. ISSN: 1438-7697. Publisher: Wiley-VCH Verlag GmbH & Co. KGaA.

AB The influence of the olive paste malaxation time on the compn. and the industrial output of oil was investigated. To this purpose, three Italian olive varieties (Leccino, Dritta, Caroleo) were processed with a centrifugal system for six malaxation periods (0, 15, 30, 45, 60 and 75 min). The concns. of the majority of the oil constituents changed during the malaxation. However, these changes were not significant for all of them: the contents of beta-carotene, the major xanthophylls, chlorophylls a and b, pheophytins a and b in the oils increased progressively with increasing malaxing times, whereas the contents of simple and hydrolysable phenols (secoiridoid derivs.), o-diphenols and total phenols decreased. A

significant increase in total volatiles and green volatiles of the lipoxygenase cascade (C6 aldehydes, C6 alcs., C5 alcs. and C5 carbonyls) was detected. An opposite trend was obsd. for the green C6 esters. As a result, the global anal. quality, flavor, aroma and shelf-life of the oils were neg. affected. The oil yield increased substantially up to 45 min of paste **malaxation** times. Beyond 60 min, the yields tended to decrease.

L4 ANSWER 4 OF 25 CAPLUS COPYRIGHT 2003 ACS on STN
2003:176501 Document No. 138:400568 Olives and their production waste products as sources of bioactive compounds. Visioli, Francesco; Galli, Claudio (Department of Pharmacological Sciences, University of Milan, Milan, Italy). Current Topics in Nutraceutical Research, 1(1), 85-88 (English) 2003. CODEN: CTNRC3. ISSN: 1540-7535. Publisher: New Century Health Publishers, LLC.

AB A review. Olives are rich in phenolic antioxidants that, during olive oil prodn., end up either in olive oil or, for their major part, in the waste water. In fact, during the **malaxation** process, i.e. the continuous washing of the olive paste with warm water prior to the procedure of sepn. of the oil from the paste, a considerable amt. of water is employed. This water, in addn. to that endogenously contained in the olives, make up to 50% of the total yield of the olive paste (olive oil amts. to .apprx.15%) and is named "waste water". In fact, due to the failure to develop a suitable end-of-pipe treatment technol., olive mill waste waters (OMWW) are currently discarded by olive oil manufacturers. *In vitro*, phenolic components of olive oil and its waste water have been shown to exert potent biol. activities including, but not limited to, antioxidant actions. Catechols from olive mill waste water can be isolated in rather pure form: 10-20 per cent of the total phenols is recovered and the only bioactive catechol is hydroxytyrosol. This ortho-diphenol has been shown by several authors to exert potent antioxidant and addnl. biol. activities, both *in vitro* and *in vivo*.

L4 ANSWER 5 OF 25 CAPLUS COPYRIGHT 2003 ACS on STN
2003:98909 Document No. 138:367827 Influence of **malaxation** time of olive paste on oil extraction yields and chemical and organoleptic characteristics of virgin olive oil obtained by a centrifugal decanter at water saving. Di Giovacchino, L.; Costantini, N.; Ferrante, M. L.; Serraiocco, A. (Istituto Sperimentale per la Elaiotecnica, Citta S. Angelo, 65013, Italy). Grasas y Aceites (Sevilla, Spain), 53(2), 179-186 (English) 2002. CODEN: GRACAN. ISSN: 0017-3495. Publisher: Instituto de la Grasa.

AB Exptl. tests were carried out to ascertain the influence of **malaxation** time of olive paste on extn. yields and qual. characteristics of virgin olive oils obtained by a centrifugal decanter at water saving. Results show that **malaxation** time has to be no less than 45 min to have a satisfactory oil extn. yield. Furthermore, it was ascertained that the **malaxation** time, protracted up to 90 min, does not have influence upon qual. and organoleptic characteristics of oils. Only the total phenol content of oils changed significantly when the **malaxation** time of olive paste increased from 15 to 90 min. However, this research has demonstrated that in some cases the total phenol content of oils increased during the first 30-45 min of **malaxation** and after it diminished. This is due to the variation of total phenol content of vegetable water that in the first time increased and after diminished very quickly. Because of the partition equil. law, the total phenol content of oil changed in the same way. Finally, results show that the compn. of volatile substances of head-space oils did not change increasing the **malaxation** time of olive paste obtained from good quality olive fruits.

L4 ANSWER 6 OF 25 CAPLUS COPYRIGHT 2003 ACS on STN
2003:46337 Document No. 139:35362 The use of biotechnology means during oil mechanical extraction process: relationship with sensory and nutritional parameters of virgin olive oil quality. Servili, M.; Selvaggini, R.; Taticchi, A.; Baldioli, M.; Montedoro, G. F. (Dipartimento di Scienze e Tecnologie Agro-alimentari, Ambientali e Microbiologiche, University of Molise, Campobasso, 86100, Italy). Acta Horticulturae, 586(Vol. 2, Proceedings of the 4th International Symposium on Olive Growing, 2000, Vol. 2), 557-560 (English) 2002. CODEN: AHORA2. ISSN: 0567-7572. Publisher: International Society for Horticultural Science.

AB The concn. of phenolic compds. in the oil is affected by the complexion of these compds. with the colloids of pastes that can reduce their release in the oil during processing. So far however, PPO and POD activities can also affect their concn. during processing while the LPO catalyze the formation of volatile compds. responsible for the green flavor of oil. The effect of the addn. of enzyme com. preps., during **malaxation**, and the influence of the O₂ level in the malaxed pastes on the phenolic and volatile concn. were studied. Enzyme com. preps. improved phenolic concn. in the paste oil and vegetation waters. The use of N₂ flush during **malaxation** reduced the oxidn. of phenols while hardly modified volatile compds. responsible for the green flavor of oil related to LPO activity.

L4 ANSWER 7 OF 25 CAPLUS COPYRIGHT 2003 ACS on STN
2003:46335 Document No. 138:319999 Relationships between phenolic composition of olive fruit and olive oil: the importance of the endogenous enzymes. Montedoro, G.; Baldioli, M.; Selvaggini, R.; Begliomini, A. L.; Taticchi, A.; Servili, M. (Dipartimento di Scienze degli Alimenti, Sez. di Industrie Agrarie, University of Perugia, Perugia, 06126, Italy). Acta Horticulturae, 586(Vol. 2, Proceedings of the 4th International Symposium on Olive Growing, 2000, Vol. 2), 551-556 (English) 2002. CODEN: AHORA2. ISSN: 0567-7572. Publisher: International Society for Horticultural Science.

AB The modification of phenolic compds. during oil mech. extn. process and the interactions with endogenous glycosidases and oxidoreductases such as polyphenoloxidase (PPO) and peroxidase (POD) of olive fruit were studied. After crushing, the concn. of secoiridoid glycosides, such as oleuropein and demethyloleuropein, decreased and their aglycon derivs. increased significantly in crushed pastes. These compds. were partially released in the oil during crushing and decreased strongly in the pastes and oils during **malaxation**. PPO and POD catalyze phenolic oxidn. in the paste and in the oil during processing, in fact the thermal inactivation of PPO and POD reduced the oxidative degrdn. of phenolic compds. The **malaxation** under N₂ flow, applied to control PPO and POD activities, strongly improved the concn. of phenolic compds. in the paste and oil.

L4 ANSWER 8 OF 25 CAPLUS COPYRIGHT 2003 ACS on STN
2002:848872 Method for flavoring an olive oil. Van Boom, Stella Sophia; Van Der Bruggen, Rob; Maitland, Reinout (Lipton, Division of Conopco, Inc., Neth.). U.S. Pat. Appl. Publ. US 20020164413 A1 20021107 (English). CODEN: USXXCO. APPLICATION: US 2001-25295 20011219. PRIORITY: EP 2000-204713 20001222.

AB A process for the manuf. of a flavoured olive oil, comprising the steps of: mixing olives with one or more flavoring agents; subjecting the mixt. to a crushing and **malaxation** treatment obtaining a **malaxation** mash; sepg. the flavored olive oil from the **malaxation** mash; collecting the flavored olive oil.

L4 ANSWER 9 OF 25 CAPLUS COPYRIGHT 2003 ACS on STN
2002:846023 Document No. 138:3783 Contribution of phenolic compounds to virgin olive oil quality. Servili, Maurizio; Montedoro, GianFrancesco (Dipartimento di Scienze degli Alimenti, University of Perugia, Perugia, 06126, Italy). European Journal of Lipid Science and

- Technology, 104(9-10), 602-613 (English) 2002. CODEN: EJLTFM. ISSN: 1438-7697. Publisher: Wiley-VCH Verlag GmbH & Co. KGaA.
- AB A review. Hydrophilic phenols are the most abundant natural antioxidants of virgin olive oil (VOO), in which, however, tocopherols and carotenes are also present. The prevalent classes of hydrophilic phenols found in VOO are phenolic alcs., phenolic acids, flavonoids, lignans and secoiridoids. Secoiridoids including aglycon derivs. of oleuropein, demethyloleuropein and ligstroside, that are present in olive fruit, are the most abundant phenolic antioxidants of VOO. In this paper, the phenolic compn. of VOO as well as the agronomic and technol. parameters that affect their concn. in the oil are discussed. The olive cultivar and the ripening stage of fruit, in fact, have always been the most studied agronomic aspects that affect phenolic concn. in VOO. However, the malaxation conditions and the extn. systems used to sep. oil from olive pastes (i.e. pressure three-phases and two-phases centrifugation systems) are also of great importance.
- L4 ANSWER 10 OF 25 CAPLUS COPYRIGHT 2003 ACS on STN
2002:846022 Document No. 138:3782 Influence of olive processing on virgin olive oil quality. Di Giovacchino, Luciano; Sestili, Simona; Di Vincenzo, Daria (Istituto Sperimentale per la Elaiotecnica, Citta S. Angelo, 65013, Italy). European Journal of Lipid Science and Technology, 104(9-10), 587-601 (English) 2002. CODEN: EJLTFM. ISSN: 1438-7697. Publisher: Wiley-VCH Verlag GmbH & Co. KGaA.
- AB A review. Virgin olive oil quality depends on different factors such as olive cultivar, olive tree cultivation and the operations of olive picking, storage and processing. Many investigations concerning these factors were carried out and, in particular, the influence of technol. operations of olive processing on oil yields and quality was examd. Leaf-removal and olive washing are important operations for the mech. safety of the olive extg. equipment which operates at high speed and for the organoleptic quality of olive oil. The leaves mixed with olives may increase, in fact, the organoleptic attributes of "fresh-cut" grass or "green", esp. if metallic crushers are used to prep. olive paste. Olive crushing has an important influence on organoleptic and nutritional qualities of virgin olive oil. When mill stones are used, the obtained oils have a lower intensity of bitterness and pungency because this crushing method helps to produce oil with a lower content of phenolic substances. When metallic crushers are used oils have, due to the violent action, a higher content of phenolic compds. and are more bitter and pungent. Olive paste malaxation influences the oil yields and also the antioxidant content of oil. With prolonged malaxation oil yields, generally, increase while the phenol content of oils decreases. When "difficult" olive pastes are processed, it is possible to increase oil yields by using technol. co-adjuvants such as talc and enzymic products during the malaxation. The sepn. of oil from solid and liq. phases of olive paste is performed by using either pressure, percolation or centrifugation systems. All systems may provide good-quality oil if olive fruits are sound and at the correct ripeness, but the centrifugation system helps to avoid or reduce the risk of an organoleptic contamination. The new centrifugal decanters, operating without adding water (or only a minimal amt. of water) to olive paste, save heat energy and the oils obtained are more fruity and have a higher content of natural phenolic antioxidants.
- L4 ANSWER 11 OF 25 CAPLUS COPYRIGHT 2003 ACS on STN
2002:540652 Document No. 138:121705 Recovery and characterisation of DNA from virgin olive oil. Muzzalupo, Innocenzo; Perri, Enzo (Rende, 87036, Italy). European Food Research and Technology, 214(6), 528-531 (English) 2002. CODEN: EFRTFO. ISSN: 1438-2377. Publisher: Springer-Verlag.

AB In an attempt to recover DNA from virgin olive oil, the performance of three different oil prodn. methods was compared. The recorded data demonstrate that only olive oil obtained by using proteinase K treatment during the malaxation process contains DNA amenable to random amplified polymorphic DNA (RAPD)-PCR amplification. This important result achieved represent the first unambiguous and reproducible RAPD-PCR amplification of DNA recovered from virgin olive oil.

L4 ANSWER 12 OF 25 CAPLUS COPYRIGHT 2003 ACS on STN
2001:912024 Document No. 136:339650 Headspace analysis of volatile flavor compounds of olive oils from Lianolia variety. Skizas, N. T.; Tasioula-Margari, M.; Komaitis, M. M. (Department of Chemistry, University of Ioannina, Ioannina, 45110, Greece). Special Publication - Royal Society of Chemistry, 274(Food Flavors and Chemistry), 248-252 (English) 2001. CODEN: SROCD0. ISSN: 0260-6291. Publisher: Royal Society of Chemistry.

AB An HSGC method that allows the detn. of volatile flavor compds. from virgin olive oils is reported. The method was employed for the qual. detn. of the volatile compds. in olive oils from Lianolia variety. The contribution of the quality characteristics of olives and processing techniques used to ext. oil from olives, in the formation of volatile flavor compds. were evaluated. Hexanal and 2-hexenal-Z are the predominant volatile compds. contributing to a pleasant sensory perception of green, apple, almond and fruity. Aldehydes such as 2-Hexenal-E, 2-heptenal-Z, 2-decenal-Z, octanal, nonanal and pentanal, responsible for undesirable flavor, were identified in samples with lower quality indexes (high acid and peroxide values). The absence of esters is probably due to the olive tree variety and to the fact that high temps. were used during malaxation process.

L4 ANSWER 13 OF 25 CAPLUS COPYRIGHT 2003 ACS on STN
2001:816827 Document No. 135:357095 Method for processing olives. Maitland, Reinout; Van Putte, Karel Petrus Agnes Maria; Stavridis, Vangelis; Tornaletti, Nicola (Unilever N.V., Neth.; Unilever PLC; Hindustan Lever Ltd.). PCT Int. Appl. WO 2001083654 A1 20011108, 18 pp. DESIGNATED STATES: W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM; RW: AT, BE, BF, BJ, CF, CG, CH, CI, CM, CY, DE, DK, ES, FI, FR, GA, GB, GR, IE, IT, LU, MC, ML, MR, NE, NL, PT, SE, SN, TD, TG, TR. (English). CODEN: PIXXD2. APPLICATION: WO 2001-EP4711 20010425. PRIORITY: EP 2000-303746 20000504.

AB The level of polyphenols in an olive oil can be increased by adding water to the olives during the crushing of the olives. In particular the invention concerns a method for processing olives obtaining an olive oil, comprising the steps of (a) crushing the olive through a sieve in the presence of 1-40% water, based on the wt. of the olives; (b) malaxation of the olives obtained in step (a); (c) decanting the olive oil.

L4 ANSWER 14 OF 25 CAPLUS COPYRIGHT 2003 ACS on STN
2001:780277 Document No. 137:19656 Effect of kneading time and temperature of olive paste on phenol content and oxidative stability of virgin olive oil from Spanish olive cultivars. Beltran, G.; Jimenez, A.; Aguilera, M. P.; Hermoso, M.; Uceda, M. (Estacion de Olivicultura y Elaiotecnia, CIFA 'Venta del Llano', Mengibar, Jaen, 23620, Spain). Special Publication - Royal Society of Chemistry, 269(Biologically-Active Phytochemicals in Food), 511-514 (English) 2001. CODEN: SROCD0. ISSN: 0260-6291. Publisher: Royal Society of Chemistry.

AB The effects of kneading time and temp. of olive paste on total polyphenols content, ortho-diphenols, bitterness and oxidative stability

of olive oil from important Spanish olive cultivars were studied at lab. level. Olive fruits were harvested at two times during the normal harvesting period. The kneading conditions assayed were: time (45, 90 and 135 min) and temp. (25, 35, and 50.degree.). Total polyphenols and ortho-diphenols contents were detd. in olive samples. Anal. of variance revealed that the Arbequina cultivar was influenced by the kneading time, while Picual was affected strongly by malaxation temp. In general, polyphenol content decreased as kneading time increased. Variation in the bitterness index in olive oils could be explained by kneading time for Arbequina oils and temp. for Picual. Oxidative stability is a parameter strongly influenced by time for Arbequina oils and for Picual oils by the temp. achieved during the kneading of the olive paste. Oil stability had the lowest values for the highest temp. Kneading conditions should be adapted to each olive cultivar.

L4 ANSWER 15 OF 25 CAPLUS COPYRIGHT 2003 ACS on STN
2001:491188 Document No. 135:210057 High-performance liquid chromatography evaluation of phenols in virgin olive oil during extraction at laboratory and industrial scale. Garcia, Aranzazu; Brenes, Manuel; Martinez, Fernando; Alba, Jose; Garcia, Pedro; Garrido, Antonio (Food Biotechnology Department, Instituto de la Grasa (CSIC), Seville, Spain). Journal of the American Oil Chemists' Society, 78(6), 625-629 (English) 2001. CODEN: JAOCA7. ISSN: 0003-021X. Publisher: AOCS Press.

AB Phenolic compds. are of fundamental importance to the quality and nutritional properties of virgin olive oils. The HPLC anal. of simple and complex olive oil phenols in the streams generated in the 2-phase extn. system was carried out using Arbequina and Picual olives. The malaxation stage reduced the concn. of o-diphenols in oil ca. 50-70%, while the concn. of the non-o-diphenols remained const., particularly the recently identified lignans 1-acetoxy pinoresinol and pinoresinol. Oxidn. of o-diphenols at lab. scale was avoided by malaxing the paste under a nitrogen atm. Phenolic compds. in the wash water used in the vertical centrifuge were also identified. Hydroxytyrosol, tyrosol, and the dialdehydic form of elenolic acid linked to hydroxytyrosol were the most representative phenols in these waters. Hence, phenolic compds. in the wash waters came from both the aq. and the lipid phases of the decanter oily must.

L4 ANSWER 16 OF 25 CAPLUS COPYRIGHT 2003 ACS on STN
2001:317628 Document No. 135:76091 Malaxing temperature affects volatile and phenol composition as well as other analytical features of virgin olive oil. Ranalli, Alfonso; Contento, Stefania; Schiavone, Carlo; Simone, Nicola (Istituto Sperimentale per l'Elaiotecnica, Department of Olive Oil Technology and Quality, Pescara, 65013, Italy). European Journal of Lipid Science and Technology, 103(4), 228-238 (English) 2001. CODEN: EJLTFM. ISSN: 1438-7697. Publisher: Wiley-VCH Verlag GmbH.

AB Three Italian olive varieties (Caroleo, Leccino and Dritta) were processed by centrifugation in the oil mill. The olive paste was kneaded at 20, 25, 30 and 35.degree.C. The results achieved revealed that the oil content in green volatiles from the lipoxygenase pathway (including C5 and C6 compds. and esp. unsatd. C6 aldehydes) decreased progressively as the kneading temp. increased, dropping markedly at 35.degree.C. The content of phenols, o-diphenols and secoiridoids showed an opposite trend, but the temp. of 35.degree.C was crit. also for them, as it was for the majority of the other components, anal. parameters and indexes related to quality, typicality and genuineness. In general, an increasing kneading temps. increased the release of oil constituents from the vegetable tissue. This factor also affected the oil extn. yields. The best overall results were achieved by malaxing the olive paste at 30.degree.C. This temp. level gave both pleasant green virgin olive oils and satisfactory oil extn. outputs.

L4 ANSWER 17 OF 25 CAPLUS COPYRIGHT 2003 ACS on STN
2001:60019 Document No. 134:325443 The phenolic and volatile compounds of virgin olive oil: Relationships with the endogenous oxidoreductases during the mechanical oil extraction process. Servili, Maurizio; Baldioli, Maura; Begliomini, Alberto L.; Selvaggini, Roberto; Montedoro, Gianfrancesco (Dipartimento di Scienze e Tecnologie Agro-alimentari, Ambientali e Microbiologiche, Universita del Molise, Campobasso, 86100, Italy). Proceedings of the Phytochemical Society of Europe, 46(Flavour and Fragrance Chemistry), 163-173 (English) 2000.

CODEN: APPEDR. ISSN: 0309-9393. Publisher: Kluwer Academic Publishers.
AB The effects of oxidoreductase activities during the oil mech. extn. process on the phenolic and volatile compds. of virgin olive oil were studied in three Italian cultivars. Phenolic compds. decreased strongly in the pastes and oil during malaxation. However, endogenous oxidoreductases such as polyphenoloxidase (PPO) and peroxidase (POD) may catalyze their enzymic oxidn. The study of PPO and POD showed that these oxidoreductases were significantly affected by the cultivar and indicated a different distribution in the constitutive parts of the fruit. In fact, the PPO was mainly present in the olive pulp, while the seed showed high POD activity. The thermal inactivation of PPO and POD strongly improved phenolic concn. in the pastes and oil and confirmed their involvement in the phenolic oxidn. during processing. The malaxation under N₂ flush, applied to control enzymic oxidn. reducing O₂ concn., improved phenolic content in the oil without significantly reducing the concn. of volatile compds. related to the lipoxygenase activity in all the cultivars studied.

L4 ANSWER 18 OF 25 CAPLUS COPYRIGHT 2003 ACS on STN
2000:890695 Document No. 134:177637 Influence of malaxation temperature and time on the quality of virgin olive oils. Angerosa, F.; Mostallino, R.; Basti, C.; Vito, R. (Contrada Fonte Umano, Istituto Sperimentale per la Elaiotecnica, Citta` S.Angelo, (PE), 65013, Italy). Food Chemistry, Volume Date 2001, 72(1), 19-28 (English) 2000.

CODEN: FOCHDJ. ISSN: 0308-8146. Publisher: Elsevier Science Ltd..
AB To study the influence of operative conditions adopted during the malaxation of pastes on the quality of resulting oils, we compared sensory characteristics, secoiridoid compds. and the volatile compn. of oils extd. from homogeneous batches of olive fruits from Coratina and Frantoio cultivars by using different malaxation times and temps. Malaxation time, and esp. temp., neg. affected the intensity of sensory attributes and the content of secoiridoid compds., modified the compn. of metabolites arising from lipoxygenase (LOX) pathways, reducing volatile compds. displaying pleasant sensations and increasing those giving less attractive perceptions, and also elevated the prodn. of 2-methylbutanal and 3-methylbutanal through amino acid conversion. Low temps. and times, ranging between 30 and 45 min, according to the rheol. of the olive pastes, were the optimal operative conditions for the malaxation.

L4 ANSWER 19 OF 25 CAPLUS COPYRIGHT 2003 ACS on STN
2000:441458 Document No. 133:58012 Process for preparing food products fortified with oleanolic acid. Van Putte, Karel Petrus A. M. (Unilever N.V., Neth.; Unilever PLC). Eur. Pat. Appl. EP 1013752 A1 20000628, 9 pp. DESIGNATED STATES: R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO. (English). CODEN: EPXXDW.

APPLICATION: EP 1999-204127 19991206. PRIORITY: EP 1998-204443 19981223.
AB Olive oil is fortified with oleanolic acid by including olive leaves in the malaxation mash of conventional olive oil pressing in an amt. of 5-50 wt.%, based on the wt. of the malaxation mash. The invention comprises vegetable oils fortified with a conc. of oleanolic acid and, optionally, oleuropein. Food products fortified with oleanolic acid contg. oils or concs. according to the invention are also part of the invention.

L4 ANSWER 20 OF 25 CAPLUS COPYRIGHT 2003 ACS on STN
1999:563327 Document No. 132:34978 Assessment of some enzymatic activities related to qualitative aspects of olive oil. Patumi, M.; Rocchi, P.; Vergari, G.; Fontanazza, G.; Nucci, R. (Ist. di Ricerche sulla Olivicoltura, Perugia, 06128, Italy). Acta Horticulturae, 474 (Vol. 2, Third International Symposium on Olive Growing, 1997), 635-638 (English) 1999. CODEN: AHORA2. ISSN: 0567-7572. Publisher: International Society for Horticultural Science.

AB PAL (L-phenylalanine ammonia lyase; E.C. 4.3.1.5), PPO (polyphenol oxidase; E.C. 1.14.18.1) and POD (peroxidase; E.C. 1.11.1.7) were exmd. in freshly milled olives and(or) after thirty minutes of **malaxation**. PAL activity varied with the cultivar; it seemed to be correlated with the phenol content in the oil. PPO and POD had a lower level of activity in all the cultivars and they remained active throughout the entire kneading time. The anal. of some products that can be generated by the oxidn. of triglycerides revealed that they may also be present in freshly-obtained oil, although in very low quantities.

L4 ANSWER 21 OF 25 CAPLUS COPYRIGHT 2003 ACS on STN
1999:563324 Document No. 132:34975 Relationship between aroma components and **malaxation** time of olive paste. Angerosa, F.; d'Alessandro, N.; Di Girolamo, M.; Vito, R.; Serraiocco, A. (Istituto Sperimentale per la Elaiotecnica, Citta S. Angelo, 65013, Italy). Acta Horticulturae, 474 (Vol. 2, Third International Symposium on Olive Growing, 1997), 621-625 (English) 1999. CODEN: AHORA2. ISSN: 0567-7572. Publisher: International Society for Horticultural Science.

AB A study was made of volatile compds. of oils extd. from two Italian varieties, "Coratina" and "Frantoio", at different **malaxation** times, was carried out. The volatile fraction was mainly formed by C6 compds. arising from the hydroperoxide lyase cascade and by C5 compds. deriving principally from a .beta.-scission mechanism involving a LOX-mediated cleavage of linolenic acid 13-hydroperoxides. In addn., metabolites which derive from the degrdn. of some amino acids and from the ferment. of sugars naturally occurring in the fruits, were detected. Quantitation of C5 and C6 components was performed by use of the recovery factors of each metabolite from the oily matrix. The amt. of each volatile increased with the prolongation of **malaxation** time and the most important change was evident in the trans-2-hexenal content. An opposite trend was recorded for the C6 ester content, which underwent a very considerable decrease after 30 min of **malaxation**. Sensory characteristics are also discussed.

L4 ANSWER 22 OF 25 CAPLUS COPYRIGHT 2003 ACS on STN
1999:563322 Document No. 132:34973 Phenolic composition of olive fruit and virgin olive oil: Distribution in the constitutive parts of fruit and evolution during the oil mechanical extraction process. Servili, M.; Baldioli, M.; Mariotti, F.; Montedoro, G. F. (Istituto di Industrie Agrarie, University of Perugia, Perugia, 06126, Italy). Acta Horticulturae, 474 (Vol. 2, Third International Symposium on Olive Growing, 1997), 609-613 (English) 1999. CODEN: AHORA2. ISSN: 0567-7572. Publisher: International Society for Horticultural Science.

AB Phenolic compds. of peel, pulp and seed of olive fruit, their distribution in oil and byproducts during oil mech. extn. and the endogenous enzymes that can catalyze phenolic modifications during processing were studied. All the constitutive parts of the fruit contained secoiridoids and phenolic acids, while luteolin-7-glucoside and rutin were found only in the peel. Crushing led to a strong decrease of secoiridoid glucoside and an increase of aglycon derivs. Verbascoside did not vary significantly. A noticeable amt. of paste phenols (>96%) was found in byproducts; oil did not contain either secoiridoid glycosides or verbascoside but showed a high concn. of secoiridoid aglycons. **Malaxation** reduced phenol concn. in oil and in byproducts. High levels of glycosidase and oxidoreductase activities were obsd. in pulp and seed.

- L4 ANSWER 23 OF 25 CAPLUS COPYRIGHT 2003 ACS on STN
1999:126140 Document No. 130:310928 The Decrease of Virgin Olive Oil Flavor Produced by High **Malaxation** Temperature Is Due to Inactivation of Hydroperoxide Lyase. Salas, Joaquin J.; Sanchez, Juan (Instituto de la Grasa, CSIC, Seville, 41012, Spain). Journal of Agricultural and Food Chemistry, 47(3), 809-812 (English) 1999. CODEN: JAFCAU. ISSN: 0021-8561. Publisher: American Chemical Society.
- AB The effect of temp. on the formation of volatile aldehydes by exts. from olive pulp was investigated by measuring the overall activity of the lipoxygenase pathway. Lipoxygenase had a broad optimum temp. around 25.degree. and maintained high activity even at 35.degree.. Hydroperoxide lyase peaked at 15.degree. and showed a marked decrease at 35.degree.. Apparently, the redn. in the formation of volatile aldehydes from linoleic acid via the lipoxygenase pathway in some olive exts. can be ascribed to the temp. sensitivity of hydroperoxide lyase.
- L4 ANSWER 24 OF 25 CAPLUS COPYRIGHT 2003 ACS on STN
1998:512803 Document No. 129:160860 Biogeneration of Volatile Compounds in Virgin **Olive** Oil: Their Evolution in Relation to **Malaxation** Time. Angerosa, F.; d'Alessandro, N.; Basti, C.; Vito, R. (Istituto Sperimentale per la Elaiotecnica, Citta S. Angelo, 65013, Italy). Journal of Agricultural and Food Chemistry, 46(8), 2940-2944 (English) 1998. CODEN: JAFCAU. ISSN: 0021-8561. Publisher: American Chemical Society.
- AB The volatile compn. of oils obtained from fruits of two Italian varieties, Coratina and Frantoio, using different **malaxation** times for the pastes was detd. The results show that the biogeneration of aroma components was very fast and took place just after cell disruption, owing to the activation of enzymes contained in the fruit. The cleavage by heterolytic hydroperoxide lyase is the most important process in both varieties considered and gives rise to C6 compds. which represent the major compds. of the **olive** oil aroma. C6 aldehydes and alcs. increase with prolongation of **malaxation**, whereas esters decrease considerably after 30 min. In addn., C5 alcs., C5 carbonyl compds., and pentene dimers were detected in the volatile compn. of virgin olive oils.
- L4 ANSWER 25 OF 25 CAPLUS COPYRIGHT 2003 ACS on STN
1995:519455 Document No. 122:298024 Waste waters from **olive** oil production are rich in natural antioxidants. Visioli, F.; Vinceri, F. F.; Galli, C. (Inst. Pharmacological Sci., Univ. Milan, Milan, I-20133, Italy). Experientia, 51(1), 32-4 (English) 1995. CODEN: EXPEAM. ISSN: 0014-4754. Publisher: Birkhaeuser.
- AB Milling of **olive** paste during **olive** oil prodn. is accompanied by continuous washing with water, i.e. **malaxation**. The resulting wastewater is currently discarded. Since olives and **olive** oil are rich in natural antioxidants, we hypothesized that some of these might be extd. from the **olive** paste during **malaxation**. Interest in natural antioxidants is increasing because of the growing body of evidence indicating the involvement of oxygen-derived free radicals in several pathol. processes, such as cancer and atherosclerosis. A wastewater ext. was characterized by HPLC and tested in a model of lipid peroxidn., copper sulfate-induced oxidn. of low d. lipoproteins. The results demonstrate that wastewater exts. have powerful antioxidant activity and might therefore represent a cheap, as yet unused, source of antioxidants.
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L2 9 S OLIVES AND MALAXATION AND OLIVE(W)OIL
L3 9 S OLIVES AND MALAXATION
L4 25 S OLIVE AND MALAXATION

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L5 16 OLIVE AND MALAXATION

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L5 ANSWER 1 OF 16 FSTA COPYRIGHT 2003 IFIS on STN
AN 2003:N0609 FSTA
TI Effect of the time of exposure to the air contact of **olive** pastes during mechanical extraction process on the volatile and phenolic compounds of virgin **olive** oil. Innovation in virgin **olive** oil processing.
AU Servili, M.; Selvaggini, R.; Baldioli, M.; Begliomini, A. L.; Taticchi, A.; Esposto, S.; Montedoro, G. F.
CS Sezione di Tec. e Biotec. degli Alimenti, Dipartimento di Sci. degli Alimenti, Univ. di Perugia, Perugia, Italy
SO Rivista Italiana delle Sostanze Grasse, (2002), 79 (12) 439-441, 18 ref.
ISSN: 0035-6808
DT Journal
LA English
SL Italian
AB To determine the effect on the volatile and phenolic compounds composition, Moraiolo cv. olives, harvested at 3 different ripening stages, were crushed and malaxated for 60 min at 30.degree.C, the resultant pastes being analysed after exposure to air at 10 min intervals

for 60 min. Analysis of the relationship between the air exposure time (TEPAC) and the pigmentation index (the measure of the olives' ripeness) showed that the concn. of phenols decreased progressively with increasing exposure time, and that there was a positive correlation between the exposure time and the content of volatile compounds, such as (E)2-hexanal and (Z)3-hexen-1-ol, responsible for the 'cut-grass' sensory note. Control of the air contact time during malaxation would appear to offer a means of controlling the enzymes promoting phenolic oxidation and catalysing volatile compound production.

CC N (Fats, Oils and Margarine)
CT OLIVES; OXIDATION; PASTES; PHENOLS; VOLATILE COMPOUNDS

L5 ANSWER 2 OF 16 FSTA COPYRIGHT 2003 IFIS on STN
AN 2003:N0475 FSTA
TI Effect of olive paste kneading process time on the overall quality of virgin olive oil.
AU Ranalli, A.; Pollastri, L.; Contento, S.; Iannucci, E.; Lucera, L.
CS Dep. of Olive Oil Tech. & Quality, Istituto Sperimentale per l'Elaiotec., Viale Petruzzi 75, 65013 Città S. Angelo, Pescara, Italy. Tel. +39-085-95294. Fax +39-085-959518. E-mail elaiotec(a)unich.it
SO European Journal of Lipid Science and Technology, (2003), 105 (2) 57-67, 46 ref.
ISSN: 1438-7697
DT Journal
LA English
AB The influence of olive paste malaxation time on composition and industrial output of pure oil was investigated. 3 Italian olive varieties (Leccino, Dritta, Caroleo) were processed with a centrifugal system for 6 malaxation periods (0, 15, 30, 45, 60 and 75 min). The concn. of the majority of the oil constituents changed during malaxation. However, these changes were not significant for all of them: the contents of .beta.-carotene, the major xanthophylls, chlorophylls a and b, pheophytins a and b in the oils increased progressively with increasing malaxation times, whereas the contents of simple and hydrolysable phenols (secoiridoid derivatives), o-diphenols and total phenols decreased. A significant increase in total volatiles and green volatiles of the lipoxygenase cascade (C.sub.6 aldehydes, C.sub.6 alcohols, C.sub.5 alcohols and C.sub.5 carbonyls) was detected. An opposite trend was observed for the green C.sub.6 esters. As a result, the global analytical quality, flavour, aroma and shelf-life of the oils were negatively affected by malaxation. The oil yield increased substantially up to 45 min of paste malaxation times. Beyond 60 min, the yields tended to decrease.

CC N (Fats, Oils and Margarine)
CT OLIVE OILS; PROCESSING; COMPOSITION; QUALITY

L5 ANSWER 3 OF 16 FSTA COPYRIGHT 2003 IFIS on STN
AN 2003:N0371 FSTA
TI Double oil extraction from olive paste and olive pomace by centrifugal decanter at 2-phases, type integral.
AU Giovacchino, L. di; Mucciarella, M. R.; Costantini, N.; Surricchio, G.
CS Istituto Sperimentale per la Elaiotecnica, Città Sant'Angelo (PE), Italy
SO Rivista Italiana delle Sostanze Grasse, (2002), 79 (10) 351-355, 15 ref.
ISSN: 0035-6808
DT Journal
LA English
SL Italian
AB Olives processed by double extraction of paste and fresh pomace, using two 2-phase centrifugal decanters not requiring addition of water, gave an average yield of oil of 87% (83.3% from the paste and 3.6% from the pomace). The quality of the olive oil extracted from the paste was superior to that from the pomace, although the latter had a higher total phenol content as a result of the heating process (at 60.degree.C) during malaxation. The content of C5 volatile compounds in the

headspace was higher in oils obtained by centrifugation of the pomace, but the C6 volatile compound content was lower. In some samples, the percentage of triterpene dialcohols (erythrodiol and uvaol) and contents of waxes and aliphatic alcohols in oils obtained from the pomace were above EU limits.

CC N (Fats, Oils and Margarine)
CT CENTRIFUGATION; EXTRACTION; OLIVE OILS; PASTES; WASTES;
COMPOSITION; POMACES; QUALITY

L5 ANSWER 4 OF 16 FSTA COPYRIGHT 2003 IFIS on STN
AN 2003:N0077 FSTA
TI Biosynthesis of triacylglycerols and volatiles in olives.
AU Sanchez, J.; Harwood, J. L.
CS Instituto de la Grasa, CSIC, Ave. Padre Garcia Tejero 4, 41012 Seville,
Spain. Tel. +34-954-611-550. Fax +34-954-616-790. E-mail
jsanchez(a)cica.es
SO European Journal of Lipid Science and Technology, (2002), 104 (9/10)
564-573, 51 ref.
ISSN: 1438-7697
DT General Review
LA English
AB Triacylglycerol synthesis in developing olives and metabolic pathways leading to formation of volatile compounds responsible for characteristic olive oil aroma are reviewed. Individual aspects considered include: C sources for oil synthesis in the olive fruit mesocarp (export of photoassimilates, photosynthesis in developing olives, contribution of fruit photosynthesis to biogenesis of olive oil); fatty acid biosynthesis (role of acetyl-coA carboxylases and fatty acid synthases, formation of oleic and linoleic acids); triacylglycerol formation (assembly of complex lipids according to the Kennedy pathway); compounds responsible for characteristic olive oil aroma (e.g. aldehydes, esters); and biogenesis of olive oil aroma (lipoxygenase and other enzyme reactions in olive pulp during oil extraction, effect of malaxation temp. on enzyme reactions and volatile compound formation, isomerization of enal compounds associated with olive oil aroma, reduction of aldehydes to form volatile alcohols, formation of esters).

CC N (Fats, Oils and Margarine)
CT AROMA COMPOUNDS; OLIVE OILS; REVIEWS; RIPENING; TRIGLYCERIDES;
TRIACYLGLYCEROLS

L5 ANSWER 5 OF 16 FSTA COPYRIGHT 2003 IFIS on STN
AN 2003:N0069 FSTA
TI Contribution of phenolic compounds to virgin olive oil quality.
AU Servili, M.; Montedoro, G. F.
CS Dipartimento di Sci. degli Alimenti, Sez. Ind. Agrarie, Univ. of Perugia,
06126 Perugia, Italy. Tel. +39-075-5857903. Fax +39-075-5857916. E-mail
servimau(a)unipg.it
SO European Journal of Lipid Science and Technology, (2002), 104 (9/10)
602-613, 86 ref.
ISSN: 1438-7697
DT General Review
LA English
AB Significance of hydrophilic phenols for quality of virgin olive oils is reviewed, together with agronomic and processing factors that can affect their concn. in the final oil. Individual aspects considered include: occurrence of hydrophilic phenols in olives and virgin olive oils; chemical structure of important phenolic compounds found in virgin olive oils; antioxidant, health and sensory properties associated with phenols in virgin olive oils; agronomic factors affecting qualitative and quantitative phenols composition (e.g. cultivar, ripening, irrigation); and effects of processing on phenols composition (crushing, malaxation and extraction).

CC N (Fats, Oils and Margarine)
CT CULTIVATION; OLIVE OILS; PHENOLS; PROCESSING; REVIEWS; QUALITY

L5 ANSWER 6 OF 16 FSTA COPYRIGHT 2003 IFIS on STN
AN 2003:N0068 FSTA
TI Influence of olive processing on virgin olive oil quality.
AU Giovacchino, L. di; Sestili, S.; Vincenzo, D. di
CS Istituto Sperimentale per la Elaiotecnica, Viale Petruzzi 37, 65013 Citta
S. Angelo (PE), Italy. Tel. +39-085-95294/95212. Fax +39-085-959518.
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SO European Journal of Lipid Science and Technology, (2002), 104 (9/10)
587-601, 80 ref.
ISSN: 1438-7697
DT General Review
LA English
AB Effects of processing operations on quality of virgin olive oils are reviewed, including effects on sensory properties, composition and oxidative stability. Individual aspects considered include: importance of leaf removal and olive washing for olive oil quality (effects of residual leaf matter and other contaminants on oil sensory properties); effects of olive crushing on oil quality (use of metallic vs. stone mill crushers); effects of olive paste malaxation; effects of co-adjuvants (e.g. talc and pectolytic enzymes) on quality of extracted oil; and oil separation from solid and liquid phases of olive paste (effects of pressure, percolation and centrifugation systems on oil quality).
CC N (Fats, Oils and Margarine)
CT OLIVE OILS; PROCESSING; REVIEWS; QUALITY

L5 ANSWER 7 OF 16 FSTA COPYRIGHT 2003 IFIS on STN
AN 2002:N0661 FSTA
TI Recovery and characterisation of DNA from virgin olive oil.
AU Muzzalupo, I.; Perri, E.
CS Correspondence (Reprint) address, E. Perri, C. da Li Rocchi, 87036 Rende (CS), Italy. Tel. +39-984-402011. Fax +39-984-402099. E-mail eperri(a)libero.it
SO European Food Research and Technology, (2002), 214 (6) 528-531, 12 ref.
ISSN: 1438-2377
DT Journal
LA English
AB Characterization of the genetic identity of DNA recoverable from olive oil could facilitate assessment of its place of origin and conformity to type due to the particular regional spread of olive cultivars and to their different contributions to the olive oil mixture as stated by each Protected Designation of Origin regulation. This requires that intact DNA should be recovered from virgin olive oil. With respect to recovery of DNA from virgin olive oil, performance of 3 production methods was compared. Only olive oil obtained by using proteinase K treatment during the malaxation process contained DNA amenable to RAPD-PCR amplification. It is suggested that this procedure could be used to certify the identity of single cultivar olive oil.
CC N (Fats, Oils and Margarine)
CT EXTRACTION; GENETIC TECHNIQUES; NUCLEIC ACIDS; OLIVE OILS; DNA; PCR; RAPD

L5 ANSWER 8 OF 16 FSTA COPYRIGHT 2003 IFIS on STN
AN 2001(12):N0903 FSTA
TI High-performance liquid chromatography evaluation of phenols in virgin olive oil during extraction at laboratory and industrial scale.
AU Garcia, A.; Brenes, M.; Martinez, F.; Alba, J.; Garcia, P.; Garrido, A.
CS Correspondence (Reprint) address, A. Garrido, Food Biotech. Dep., Inst. de la Grasa (CSIC), Avda. Padre Garcia Tejero 4, Seville, Spain. E-mail

SO garfer(a)cica.es
Journal of the American Oil Chemists' Society, (2001), 78 (6) 625-629, 20 ref.
ISSN: 0003-021X

DT Journal
LA English

AB Phenolic compounds are of fundamental importance to the quality and nutritional properties of virgin olive oils. HPLC analysis of simple and complex olive oil phenols in the streams generated in the 2-phase extraction system was carried out using Arbequina and Picual olives. The malaxation stage reduced the concn. of orthodiphenols in oil by approx. 50-70%, while the concn. of the nonorthodiphenols remained constant, particularly levels of the recently identified lignans 1-acetoxyphenoxyresinol and phenoxyresinol. Oxidation of orthodiphenols on a laboratory scale was avoided by malaxing the paste under a nitrogen atmosphere. Phenolic compounds in the wash water used in the vertical centrifuge were also identified. Hydroxytyrosol, tyrosol, and the dialdehydic form of elenolic acid linked to hydroxytyrosol were the most representative phenols in these waters. Hence, phenolic compounds in the wash waters came from both the aqueous and lipid phases of the decanter oily must.

CC N (Fats, Oils and Margarine)
CT EXTRACTION; OLIVE OILS; PHENOLS

L5 ANSWER 9 OF 16 FSTA COPYRIGHT 2003 IFIS on STN
AN 2001(08):N0651 FSTA

TI Malaxing temperature affects volatile and phenol composition as well as other analytical features of virgin olive oil.

AU Ranalli, A.; Contento, S.; Schiavone, C.; Simone, N.

CS Dep. of Olive Oil Tech. & Quality, Istituto Sperimentale per l'Elaiotec., Viale Petruzzi 75, 65013 Città S. Angelo (Pescara), Italy. Tel. +39-085-95294. Fax +39-085-959518. E-mail elaiotec(a)unich.it

SO European Journal of Lipid Science and Technology, (2001), 103 (4) 228-238, 47 ref.
ISSN: 1438-7697

DT Journal
LA English

AB Virgin olive oils extracted using 4 malaxation temp. were examined for contents of volatile compounds and phenols, and other quality indices. 3 Italian olive oil var. (Caroleo, Leccino and Dritta) were processed by centrifugation and the olive pastes were kneaded at 20, 25, 30 and 35.degree.C. Results revealed that the content of green volatiles in the oil from the lipoxygenase pathway (including C_{sub}.5 and C_{sub}.6 compounds and especially unsaturated C_{sub}.6 aldehydes) decreased progressively as the kneading temp. increased, dropping markedly at 35.degree.C. The content of phenols, o-diphenols and secoiridoids showed an opposite trend, although the temp. of 35.degree.C was critical, as it was for the majority of the other components, analytical parameters and indices related to quality, typicality and authenticity. In general, an increasing kneading temp. increased the release of oil constituents from the vegetable tissue and also affected oil extraction yields. Best overall results were achieved by malaxing the olive paste at 30.degree.C which led to both pleasant green virgin olive oils and satisfactory oil extraction outputs.

CC N (Fats, Oils and Margarine)
CT EXTRACTION; OLIVE OILS; PHENOLS; TEMPERATURE; VOLATILE COMPOUNDS; QUALITY; TEMP.

L5 ANSWER 10 OF 16 FSTA COPYRIGHT 2003 IFIS on STN
AN 2001(06):N0440 FSTA

TI Improvement of phenolic compound content in virgin olive oils by using enzymes during malaxation.

AU Garcia, A.; Brenes, M.; Moyano, M. J.; Alba, J.; Garcia, P.; Garrido, A.

CS Correspondence (Reprint) address, A. Garrido, Food Biotech. Dep., Inst. de la Grasa, CSIC, Avda. Padre Garcia Tejero 4, 41012 Seville, Spain. Fax +34-954691262. E-mail garfer(a)cica.es

SO Journal of Food Engineering, (2001), 48 (3) 189-194, 21 ref.

ISSN: 0260-8774

DT Journal

LA English

AB Use of enzymes to enhance yields during olive oil extraction may increase levels of certain phenols in the product. This study investigated the influence of commercial enzyme (Olivex + Novoferm and Olivex + Glucanex; Novo Nordisk, Switzerland) addition to olive pastes during extraction, upon the phenol composition of resulting virgin olive oils extracted from cv. Picual and Arbequina olives. Addition of enzymes to olive pastes before the malaxation stage resulted in higher levels of phenols in oils compared with those subjected to extraction without use of enzymes. Highest levels of phenols were observed in oils extracted from Arbequina olives. Enzyme treatment generally enhanced levels of orthodiphenols more than non-orthodiphenols. The positive effect of enzymes was accompanied by a lower peroxide index and higher Rancimat stability in oils. Levels of phenols in wash water from the vertical centrifuge used during oil extraction also increased when pastes were treated with enzymes. It is concluded that enzymic treatment of olive paste could have important implications for storage stability and nutritional quality of olive oils.

CC N (Fats, Oils and Margarine)

CT ENZYMES; EXTRACTION; OLIVE OILS; PHENOLS

L5 ANSWER 11 OF 16 FSTA COPYRIGHT 2003 IFIS on STN

AN 2001(02):N0158 FSTA

TI Influence of malaxation temperature and time on the quality of virgin olive oils.

AU Angerosa, F.; Mostallino, R.; Basti, C.; Vito, R.

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SO Food Chemistry, (2001), 72 (1) 19-28, 36 ref.

ISSN: 0308-8146

DT Journal

LA English

AB During extraction of virgin olive oils the malaxation step, consisting of a low and continuous kneading of olive pastes, is important for increasing oil yields. In this study, effect of temp. and duration of malaxation on the quality of virgin olive oils was investigated. Oils were extracted from 2 olive cv. (Coratina and Frantoio) using 15-90 min malaxation at 25 or 35.degree.C; oils were analysed for total secoiridoid compounds, volatile compounds and sensory properties. Increasing the duration of malaxation decreased the content of secoiridoid compounds, promoted the increase of C.sub.6 and C.sub.5 carbonyl compounds, and affected the sensory properties of the oils detrimentally. Increasing malaxation temp. markedly affected the quality of the oils, resulting in the following: sensory flattening; considerable losses in secoiridoid compounds and also C.sub.6 esters and cis-3-hexen-1-ol (contributors to delicate green perceptions); increases in hexan-1-ol and trans-2-hexen-1-ol (elicitors of less favourable sensory perceptions); and production of very high levels of 2- and 3-methyl butanal through activation of the amino acid conversion pathway. It is concluded that optimal malaxation conditions for production of good quality oil with a satisfactory yield are 30-45 min at low temp.

CC N (Fats, Oils and Margarine)

CT EXTRACTION; OLIVE OILS; TEMPERATURE; QUALITY; TEMP.

L5 ANSWER 12 OF 16 FSTA COPYRIGHT 2003 IFIS on STN

AN 2000(07):N0392 FSTA

TI Effect of the extraction conditions of virgin olive oil on the lipoxygenase cascade: chemical and sensory implications.

AU Morales, M. T.; Angerosa, F.; Aparicio, R.

CS Correspondence (Reprint) address, R. Aparicio, Inst. de la Grasa, Avenida Padre Garcia Tejero 4 , 41012 Seville, Spain

SO Grasas y Aceites, (1999), 50 (2) 114-121, 39 ref.

ISSN: 0017-3495

DT Journal

LA English

SL Spanish

AB Samples of olives of 3 cv. (Picual, Coratina and Frantoio) were used in a study conducted to assess effects of extraction conditions on the lipoxygenase cascade, volatile compounds content and sensory quality of olive oils. Extraction temp. of 25-35.degree.C were used, with malaxation times of 15-90 min. The relation of volatile compounds to sensory quality of the olive oils is discussed; C6 components derived from fatty acids via the lipoxygenase cascade are responsible for the characteristic 'green' aroma note of olive oils. Optimization of extraction conditions for high sensory quality of olive oils is discussed. In general, a temp. of 25.degree.C and malaxation time of 35-45 min gave the best sensory quality; 35.degree.C with short malaxation time (<35 min) may be a useful alternative process.

CC N (Fats, Oils and Margarine)

CT EXTRACTION; LIPOXYGENASES; OLIVE OILS; SENSORY PROPERTIES; VOLATILE COMPOUNDS

L5 ANSWER 13 OF 16 FSTA COPYRIGHT 2003 IFIS on STN
AN 2000(04):N0203 FSTA

TI Extraction systems and olive oil.

AU Bianchi, G.

CS Istituto Sperimentale per la Elaiotecnica, Contrada Fonte Unmano, 65013 Citta Sant'Angelo, Pescara, Italy

SO OCL, (1999), 6 (1) 49-55, 10 ref.

ISSN: 1258-8210

DT Journal

LA English

AB Extraction systems for olive oil are discussed with reference to: structure of the olive fruit; composition of the olive fruit and of olive oil; basic aspects of extraction of olive oil; crushing; kneading (beating or malaxation) of the crushed olive paste; extraction (pressing, centrifugation or percolation); olive oil quality parameters; extraction systems in relation to quality; and volatile compounds in olive oil.

CC N (Fats, Oils and Margarine)

CT EXTRACTION; OLIVE OILS; QUALITY

L5 ANSWER 14 OF 16 FSTA COPYRIGHT 2003 IFIS on STN
AN 1999(07):N0374 FSTA

TI The decrease of virgin olive oil flavor produced by high malaxation temperature is due to inactivation of hydroperoxide lyase.

AU Anon.

SO Journal of Agricultural and Food Chemistry, (1999), 47 (3) 809-812, 23 ref.

ISSN: 0021-8561

DT Journal

LA English

AB Effects of malaxation temp. (0-35.degree.C) on biogenesis of the most prevalent constituents of olive oil aroma were studied. In particular, effect of temp. on enzymes involved in formation of 6-C (volatile) aldehydes by enzyme extracts from olive pulp was investigated by measuring overall activity of the lipoxygenase (LOX)

pathway. Acetone powder from olives was used to prepare enzyme suspensions capable of catalysing formation of hexanal from linoleic acid, a process that involves sequential action of LOX and hydroperoxide lyase (HPL). 2 radiolabelled substrates, [$1\text{-}.\sup{1}\text{-}\sup{4}\text{C}$] - and [$U\text{-}.\sup{1}\text{-}\sup{4}\text{C}$]linoleate, were used. When the enzyme suspension was incubated with [$1\text{-}.\sup{1}\text{-}\sup{4}\text{C}$]linoleate, fatty acid hydroperoxides and .omega.-oxoacids were detected. The 2 compounds accounted for .gtoreq.85% of the radioactivity associated with metabolism of labelled linoleate. The highest rates of transformation of the labelled precursor were measured at temp. <25.degree.C with a drastic decrease in activity at 30-35.degree.C. Formation of .omega.-oxoacids peaked at 15.degree.C, whereas formation of intermediate fatty acid hydroperoxide was less affected by temp. [$U\text{-}.\sup{1}\text{-}\sup{4}\text{C}$]Linoleate was then used as a labelled substrate. Hexanal was the only product detected in the headspace. Results showed that the olive enzyme system is highly specific for formation of 6-C aldehydes, and that the LOX/HPL system specifically catalyses formation of hexanal from linoleic acid. It is concluded that the reduction in production of volatile aldehydes from linoleic acid through the LOX pathway can be ascribed to the unusual behaviour of HPL against temp. Moreover, results explain the observation that olive oils extracted at low malaxation temp.

(20.degree.C) possess higher flavour properties than those obtained under standard conditions.

CC N (Fats, Oils and Margarine)

CT ALDEHYDES; AROMA COMPOUNDS; LINOLEIC ACID; LIPOXYGENASES; LYASES; OLIVE OILS; PROCESSING; TEMPERATURE; HEXANAL; HYDROPEROXIDE LYASE; MALAXATION; TEMP.

L5 ANSWER 15 OF 16 FSTA COPYRIGHT 2003 IFIS on STN
AN 1998(12):N0643 FSTA

TI Biogeneration of volatile compounds in virgin olive oil: their evolution in relation to malaxation time.

AU Angerosa, F.; d'Alessandro, N.; Basti, C.; Vito, R.; Alessandro, N. d'
CS Istituto Sperimentale per la Elaiotecnica, Contrada Fonte Umano, 65013
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SO Journal of Agricultural and Food Chemistry, (1998), 46 (8) 2940-2944, 20
ref.

ISSN: 0021-8561

DT Journal

LA English

AB The volatiles composition of oils obtained from olives of 2 Italian var., Coratina and Frantoio, using different malaxation times of olive pastes was determined. Results showed that the biogeneration of aroma components was very fast and took place just after cell disruption, owing to the activation of enzymes contained in the fruit. Cleavage by heterolytic hydroperoxide lyase was the most important process in both varieties considered and gave rise to C.sub.6 compounds which represent the major compounds of the olive aroma. Contents of C.sub.6 aldehydes and alcohols increased with the prolonging of malaxation, whereas contents of esters considerably decreased after 30 min. In addition, C.sub.5 alcohols, C.sub.5 carbonyl compounds, and pentene dimers were detected in the volatiles composition of virgin olive oils.

CC N (Fats, Oils and Margarine)

CT OLIVE OILS; VOLATILE COMPOUNDS

L5 ANSWER 16 OF 16 FSTA COPYRIGHT 2003 IFIS on STN
AN 1994(05):N0019 FSTA

TI Pectinase production from olive vegetation waters and its use in the mechanical olive oil extraction process to increase oil yield and improve quality.

AU Montedoro, G. F.; Begliomini, A. L.; Servili, M.; Petruccioli, M.; Federici, F.

CS Istituto di Ind. Agrarie, Univ. di Perugia, 0612 Perugia, Italy
SO Italian Journal of Food Science, (1993), 5 (4) 355-362, 17 ref.
DT Journal
LA English
AB A multi-phase disposal process for olive vegetation waters (OVW), which result from the mechanical extraction of olive oil, was studied in relation to 2 main phases of the technological process: biological treatment of OVW to obtain an enzymic concentrate and direct recycling of this concentrate in the mechanical olive oil extraction process. The disposal treatment for OVW includes static settling, sterilization, fermentation, centrifugation (in which biomass is recovered and used as an animal feed) and ultrafiltration (resulting in a permeate that is discarded and an enzymic retentate concentrate). The enzymic retentate concentrate is recycled and used in the malaxation step in the mechanical olive oil extraction process. The fermentation step with the yeast Cryptococcus albidus var. albidus IMAT 4735 led to production of a polygalacturonase with an activity of 25 VU/ml in the culture broth. After centrifugation, the broth was concentrated by ultrafiltration (4-5x) and used in the extraction process. This operation resulted in an increase of 8-9% in olive oil yield and improved oil quality; turbidity, oxidation induction time, chlorophyll and contents of aromatic compounds were generally improved.
CC N (Fats, Oils and Margarine)
CT BIOTECHNOLOGY; ENZYMES; EXTRACTION; FERMENTATION; FERMENTATION PRODUCTS; GLYCOSIDASES; OILS; OLIVE OILS; PECTIC ENZYMES; PROCESSING; VEGETABLE PRODUCTS; WASTE WATER; OLIVE OIL MILLS EFFLUENTS; POLYGALACTURONASES

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8	9	((426/601,417,615,478,481,489,330.6).CCLS.) and malaxation	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/11/25 08:08
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